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connected to said first and second discharge electrode feedthrough means, respectively,

wherein the aspect ratio (IL/ID) is in the range of about 3.3 to about 6.2mm.

REMARKS

Claims 1 to 19 and ~~31~~ 30 to ~~35~~ 34 are now in this case. Claims 20 to 30, withdrawn from further consideration as being non-elected responsive to a restriction requirement, have been cancelled.

The claims have been amended to more particularly define the invention.

Claims 10 and 15 are separately objected to for the reasons set forth at page 2 of the Office Action. The claims as amended are no longer subject to this ground of objection although the specific errors objected to could not be found in these particular claims.

Claims 17-19 stand rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility.

Claims 17-19 stand rejected also under 35 U.S.C. 112 as not being supported by either a specific and substantial asserted utility or a well established utility.

Claims 1-16 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over Van Vliet et al, U.S. 5,973,453 in view of Krasko et al, U.S. 5,694,002.

Claims 3-16 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over Van Vliet et al, U.S. 5,973,453 in view of Van Der Leeuw et al, U.S. 5,532,543.

Claims 1-19 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-19 of co-pending application No. 09/851,443. A Terminal Disclaimer obviating this ground of rejection is filed herewith.

Reconsideration of the claims and withdrawal of the rejections is requested.

High intensity discharge (HID) lamps are commonly used in large area lighting applications, due to their high energy efficiency and superb long life. The existing HID product range consists of mercury vapor (MV), high pressure sodium (HPS), and quartz metal halide (MH) lamps. In recent years, ceramic metal halide lamps (for example, Philips MasterColor® Series) have entered the market place. The MasterColor lamps are versatile light sources, since they can be mounted in either regular glass or quartz bulbs or in PAR reflectors.

The salt mixture used in Philips MasterColor® series lamps is composed of NaI, CaI_2, TlI, and rare-earth halides of DyI_3, HoI_3 and TmI_3. NaI, CaI_2 and TlI are mainly for emitting high intensity line radiation at various colors, but they also contribute to continuous radiation. The rare-earth halides are for continuous radiation throughout the visible range, resulting in a high color rendering index (CRI). By adjusting the composition of the salts, color temperatures of 3800-4500K, and a CRI of above 85 can be achieved. The existing power range of such lamps is from 20W to 150W. The relatively narrow power range makes these products only suitable for the applications requiring low power installations, such as most indoor low-ceiling retail spaces. For large area, higher power applications requiring a lamp power of 200W to 1000W, the primary available

products are MV, HPS and MH lamps.

One example of a lamp of the kind set forth is known from US 5,424,609. The known lamp has a comparatively low power of 150 W at the most at an arc voltage of approximately 90 V. Because the electrode in such a lamp conducts comparatively small currents during operation of the lamp, the dimensions of the electrode may remain comparatively small so that a comparatively small internal diameter of the projecting plug suffices. In the case of a lamp having a rated power in excess of 150 W, or a substantially lower arc voltage, for example as in the case of large electrode currents, electrodes of larger dimensions are required. Consequently, the internal plug diameter will be larger accordingly. It has been found that in such lamps there is an increased risk of premature failure, for example due to breaking off of the electrode or cracking of the plug.

The present invention addresses the need in the art for HID lamps of the ceramic metal halide type with power ranges of about 150W to about 1000W, for example, ceramic metal halide lamps of the Philips MasterColor® series that display excellent initial color consistency, superb stability over life (lumen maintenance >80%, color temperature shift <200K at 10,000 hrs), high luminous efficacy of >90 lumens/watt, a lifetime of about 20,000 hours, and power ranges of about 150W to about 1000W.

According to a first embodiment of the invention, ceramic metal halide lamps having a power range of about 150W to about 1000W, are provided having one or more and most preferably all of the following properties: a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean

perceptible color difference) of about ±10, and a luminous efficacy up to about 85-95 lumens/watt.

In another embodiment, ceramic metal halide lamps are provided which have been found, regardless of the rated power, to have a lumen maintenance of >80%, color temperature shift <200K from 100 hours to 8000 hours, and lifetime of about 10,000 to about 25,000 hours.

In another embodiment, ceramic metal halide lamps are provided that display excellent initial color consistency, superb stability over life (lumen maintenance >80%, color temperature shift <200K at 10,000 hrs), high luminous efficacy of >90 lumens/watt, a lifetime of about 20,000 hours, and power ranges of about 150W to about 1000W.

The invention also provides novel design spaces containing parameters for any lamp power between about 150W and 1000W in which appropriate parameters for the body design of a lamp operable at the desired power is obtained by selection from parameters in which (i) the arc tube length, diameter and wall thickness limits are correlated to and expressed as functions of lamp power, and/or color temperature, and/or lamp voltage, and (ii) the electrode feedthrough structure used to conduct electrical currents with minimized thermal stress on the arc tube are correlated to and expressed as a function of lamp current. The invention also provides methods for producing ceramic metal halide lamps having predetermined properties through use of the design spaces of the invention.

In embodiments of the invention, certain design parameters have been found to mitigate and in most cases eliminate the effects of higher thermal stress associated with the higher lamp powers. These parameters have been found to be especially

suitable for the production of lamp products of 150W to 400W of power and 100V of lamp voltage, and with modifications in some of the design parameters, lamps with 135V-260V voltage and/or higher powers (up to 1000W) may also be designed. These design parameters are:

(i) the general aspect ratio, i.e. the ratio of the inner length (IL) to the inner diameter (ID) of the PCA arc tube body is higher than that of low power-range MasterColor® lamps.

(ii) general design spaces for any lamp power between 150W and 1000W, in terms of arc tube length, diameter and wall thickness limits, are expressed as functions of lamp power, color temperature, and lamp voltage and the upper and lower limits of such parameters are determined for the selected lamp powers and a method is provided for selecting parameters from the design space to provide a lamp with previously selected characteristics.

(iii) a unique laser-welded Tungsten-(Molybdenum, optional)-cermet-Niobium electrode feedthrough structure is used to conduct large electrical currents with minimized thermal stress on the PCA.

(iv) the design parameter limits of such feedthroughs are given as the function of lamp current.

(v) for reducing the risk of non-passive failure, a molybdenum coil wrapped around the arc tube and around the extended plugs is used.

(vi) the salt composition is adjusted, to the desired color temperatures, for the geometry and varying lamp voltages of the high power MasterColor® lamps. A general composition range of the salts is given.

(vii) the starting characteristics of the lamps are accomplished by using a mixture of Xenon, Argon, Krypton and ^{85}Kr gases.

Referring to Figures 1 to 7 and 11, the above design parameters may be categorized as including one or more of the following:

(1) Design space limits for arc tube geometry;

(2) Electrode feedthrough construction and design limits;

(3) Composition range of iodide salts for achieving desired photometric properties (CCT = 3800 - 4500K, CRI = 85-95, MPCD = ±10, luminous efficacy of 85 - 95 lumens/watt); and

(4) Buffer gas composition and pressure range.

An especially important aspect of the invention lies in the discovery of the parameter limits within which the whole product family having a power of 150W to 1000W, regardless of the specific rated power, has a lumen maintenance of >80% at 8000 hours (see Figure 11 for an example); color temperature shift <200K from 100 hours to 8000 hours; and a lifetime in a range of 10,000 hours to 25,000 hours.

Design space for arc tube geometry

The arc tube geometry is defined by a set of parameters best illustrated in Figures 1 to 5 and Figure 9 which also illustrates major parameters used. As seen in Figures 1 and 9, the arc tube body inner length (IL) is determined by lamp power. The upper and lower limit of IL for any given lamp power between 150W and 400W can be found in Figure 1.

The arc tube body inner diameter (ID) is also a function of lamp power. The upper and lower limits of the ID for any given lamp power from 150W to 400W are shown in Figure 2.

One of the common characteristics of this higher wattage MasterColor® lamp family is that the aspect ratio of the arc tube body is higher than that of the lower wattage (30-150W) Philips MasterColor® lamps (About 1.0). For any given lamp power for the lamps of the present invention, the aspect ratio (IL/ID) falls into a range of 3.3-6.2. The geometric design space is shown in an IL-ID plot in Figure 3. The shaded space shown in Figure 3 is the general design space which does not specify lamp power.

How each design is compared with others of different rated powers is measured by "wall loading". Wall loading is defined as the ratio of power and the inner surface area of arc tube body, in a unit of W/cm^2. In Figure 4, the upper line is the wall loading value as if the IL and ID are both at their lower limits for the power, therefore the inner surface area is the minimum and wall loading is at maximum. The lower line is the wall loading level as if both IL and ID are at upper limits, making the surface area the maximum and wall loading minimum. Any other designs should have a wall loading range between $23\text{-}35W/cm^2$, as indicated by the individual points inside the shaded area. Across the power range of 150W to 400W, the wall loading level remains fairly constant.

Generally, arc tubes for higher lamp power require a thicker wall, in accordance with the larger volume. The limits of the wall thickness are specified in Figure 5.

Electrode feedthrough construction and design parameters

Electrodes for conducting current and acting alternatively as cathode and anode for an arc discharge are constructed specifically for the ceramic arc tubes. Figures 9 and 10 give the details of the components and their relative positions in the arc tube and show the preferred embodiments of the arc tube 20 having a four-part and a three-part feedthrough, respectively, in which electrodes 30, 40 each have a lead-in 32, 42 of niobium which is sealed with a frit 33, 43, a central portion 34, 44 of molybdenum/aluminum cermet, a molybdenum rod portion 35, 45 and a tungsten tip 36, 46 having a winding 37, 47 of tungsten and/or in which electrodes 30, 40 each have a lead-in 32, 42 of niobium which is sealed with a frit 33, 43, a central portion 34, 44 of molybdenum/aluminum cermet, and a tungsten tip 36, 46 having a winding 37, 47 of tungsten. Preferably, each joint connecting two feedthrough components is welded by a laser welder. Although the three-part feedthrough structure is similar to those used in the lower wattage Philips MasterColor® lamps, the preferred design parameters for constructing the feedthroughs for larger current are given here.

The primary design parameters for feedthroughs include electrode rod diameter and length as illustrated in Figs. 6 and 7 which indicate the limits for rod diameter and rod length, versus lamp current.

Preferably additional parameters are present for the preferred embodiments of the feedthrough construction and include: (1) the tip extension of the electrode is in the range of 0.2-1mm, (2) the tip-to-bottom (ttb) distance, i.e. the length of electrode inside the arc tube body, is in a range of 1mm to 4mm and generally increases with power, (3) cermet should

contain no less then about 35 wt.% of Mo, with a preferred Mo content of no less than about 55 wt.%, with the remainder being Al_2O_3, and (4) the frit (also known as sealing ceramic) flow should completely cover the Nb rod.

Thus according to the invention, the following approximations of PCA arc tube and feedthrough characteristics define design spaces in which the desired lamp power may be selected from the parameters and vice versa:

TABLE I

Power W	IL mm	ID mm	IL/ID Aspect Ratio, mm	Wall Loading W/cm^2	Wall Thickness mm	Rod Diameter mm	Rod Length mm
150	26-32	5-7	3.3-6.2	20-35	0.8-1.1	0.4-0.6	3-6
200	27-32	6.5-7.5	3.3-6.2	25-30	0.85-1.2	0.4-0.6	4-8
250	28-34	7.5-8.5	3.3-6.2	25-35	0.9-1.3	0.7-1.0	6-10
300	30-36	8-9	3.3-6.2	25-37	0.92-1.4	0.7-1.0	6-10
350	33-40	8.5-10	3.3-6.2	24-40	0.98-1.48	0.7-1.1	6-11
400	36-45	8.5-11	3.3-6.2	22-40	1.0-1.5	0.7-1.1	6-11

Preferably also (1) the tip extension of the electrode is in the range of 0.2-1mm, (2) the tip-to-bottom (ttb) distance is in a range of 1mm to 4mm and generally increases with power, (3) the cermet contains no less then about 35 wt.% Mo, with a preferred Mo content of no less than about 55 wt.% with the remainder being Al_2O_3, and (4) the frit (also known as sealing ceramic) flow completely covers the Nb rod.

The lamp product family of the invention has a wide range of usage in both indoor and outdoor lighting applications. The primary indoor applications include constantly occupied large-area warehouse or retail buildings requiring high color rendering index, high visibility and low lamp-to-lamp color variation. Outdoor applications include city street lighting, building and structure illumination and highway lighting.

Van Vliet, U.S. Patent 5,973,453 is assigned to U.S. Philips Corporation and is directed to results from research under auspices closely related to those of the present application. This patent illustrates metal halide lamps with ceramic discharge vessels having a power of 150W and 185W, electrodes with spacing EA, internal diameter DI, and EA/DI>5. Lamps as claimed are not disclosed or contemplated. The Examiner acknowledges that clearly a lamp having the claimed properties is not disclosed and relies on Krasko et al and Van Der Leeuw (also assigned to U.S. Philips), claiming that Krasko discloses a metal halide lamp with a luminous efficacy and Van Der Leeuw discloses a discharge lamp with a tungsten rod having a winding of tungsten as claimed herein, and it would be obvious to incorporate the teachings of Krasko et al and Van Der Leeuw with Van Vliet et als' for the purpose of improving the luminous efficacy and securing the discharge vessel, respectively. It is submitted that Krasko et al and Van Der Leeuw are insufficient to cure the deficiencies of Van Vliet pointed to above. Krasko appears to be directed to metal halide lamps with quartz discharge vessels having lower lamp wattages such as 50, 70, 100 and 150W lamps.

It is submitted that those skilled in the art would not find it obvious to combine the teachings of Krasko et al and Van Der Leuw. Both Krasko et al and Van Der Leuw are directed to lower wattage metal halide lamps with quartz discharge vessels and are not properly combinable with Van Vliet et al which is directed to metal halide lamps with ceramic discharge vessels. Indeed, Van Vliet et al teaches away from such a combination.

Van Vliet et al is directed to metal halide lamps that comprise a discharge vessel with a ceramic wall. Also, at column 1, lines 5 et seq., Van Vliet et al discloses that prior metal halide lamps with excellent color properties and based on properties of sodium halide required a high coldest spot temperature in the discharge vessel such that the use of quartz discharge vessels are excluded and the use of a ceramic material for the discharge vessel wall is necessary. While not discussing it further, Van Vliet is specific to a ceramic discharge vessel as is the instant invention. In any event, this disclosure in Van Vliet indicates that the art recognizes that quartz and ceramic discharge vessels are not equivalent or interchangeable in metal halide lamps. The Examiner's assertion and combination is not supported by the references. Accordingly, the rejection under 35 U.S.C. 103 is untenable and should be withdrawn.

It is submitted that this application is in condition for allowance. An early issuance is solicited.

An Appendix showing the marked up version of the amended specification and claims is attached.

Respectfully submitted,

By Ernestine C. Bartlett

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On May 30, 2003

By Ernestine C. Bartlett

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APPENDIX A

Page 18, in the paragraph beginning at line 3, amend to read as follows:

As discussed above, for reducing the risk of non-passive failure, a molybdenum coil wrapped around the arc tube and around the extended plugs is used as disclosed in U.S. Patent application Serial Number ________ 09/851,443 filed of even date herewith as a divisional application of this application by Sarah Carleton and Kent Collins for "Coil Antenna/Protection For Ceramic Metal Halide Lamps".

APPENDIX B

Amended Claims

We claim:

1. (amended) A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

~~Said~~ said lamp having a power range of about 150W to about 1000W and exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about ±10, and (b) a luminous efficacy up to about 85-95 lumens/watt.

2. A lamp as claimed in Claim 1 retrofit with ballasts and lighting fixtures designed for high-pressure sodium or quartz metal halide lamps.

3. (amended) A discharge lamp having a power range of about 150W to about 1000W, exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about +10, and (b) a luminous efficacy up to about 85-95 lumens/watt, and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively,~~.~~

~~Wherein~~ wherein the ceramic discharge vessel includes an arc tube comprising:

A cylindrical barrel having a central axis and a pair of opposed end walls,

A pair of ceramic end plugs extending from respective end walls along said axis,

A pair of lead-ins extending through respective end plugs, said lead-ins being connected to respective electrodes which are spaced apart in said central barrel,

Wherein the electrode feedthrough means each have a lead-in of niobium which is hermetically sealed into the arc tube, a central portion of molybdenum/aluminum cermet, a molybdenum rod portion and a tungsten rod having a winding of tungsten.

4. A lamp as claimed in Claim 3, wherein the arc tube has a molybdenum coil attached to its surface.

5. A lamp as claimed in Claim 4, wherein the discharge space contains an ionizable filling of an inert gas, a mixture of metal halides, and mercury.

6. A lamp as claimed in Claim 5 wherein, said discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gas-tight manner by means of a sealing ceramic and has a part formed from aluminum oxide and molybdenum which forms a cermet at the area of the gas-tight connection.

7. A lamp as claimed in Claim 5, wherein, said discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gas-tight manner by means of a sealing ceramic and has a first part formed from aluminum oxide and molybdenum which forms a cermet at the area of the gas-tight connection and a second part which is a metal part and extends from the cermet in the direction of the electrode.

8. A lamp as claimed in Claim 7, wherein the metal part is a molybdenum rod.

9. A lamp as claimed in Claim 5, wherein the arc tube has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2.

10. A lamp as claimed in Claims 6 and 7, wherein the electrode has a tip extension in the range of about 0.2 to about 1mm; the cermet contains at least about 35 wt.% Mo with the remainder being Al_2O_3, and the as sealing ceramic flow completely covers the Nb connector.

11. A lamp as claimed in Claim 10, wherein the arc tube and the electrode feedthrough means have the following characteristics for a given lamp power:

Power W	IL mm	ID mm	IL/ID Aspect Ratio, mm	Wall Loading W/cm^2	Wall Thickness mm	Rod Diameter mm	Rod Length mm
150	26-32	5-7	3.3-6.2	20-35	0.8-1.1	0.4-0.6	3-6
200	27-32	6.5-7.5	3.3-6.2	25-30	0.85-1.2	0.4-0.6	4-8
250	28-34	7.5-8.5	3.3-6.2	25-35	0.9-1.3	0.7-1.0	6-10
300	30-36	8-9	3.3-6.2	25-37	0.92-1.4	0.7-1.0	6-10
350	33-40	8.5-10	3.3-6.2	24-40	0.98-1.48	0.7-1.1	6-11
400	36-45	8.5-11	3.3-6.2	22-40	1.0-1.5	0.7-1.1	6-11

12. A lamp as claimed in Claim 11, wherein said metal halide mixture comprises the following salts of 6-25 wt% NaI, 5-6 wt% TlI, 34-37 wt% CaI_2, 11-18 wt% DyI_3, 11-18 wt% HoI_3, and 11-18 wt% TmI_3.

13. A lamp as claimed in Claim 12, wherein the ionizable filling is a mixture of about 99.99% of Xenon and a trace amount of ^{85}Kr radioactive gas.

14. A lamp as claimed in Claim 12, wherein the ionizable filling is a mixture of Argon (and/or Krypton), Xenon and a trace amount of ^{85}Kr radioactive gas.

15. A lamp as claimed in Claim 12, wherein the ionizable filling is Xenon (and/or Krypton).

16. A lamp as claimed in Claim 1, 5, and 13, having a power range of about 150W to about 1000W and nominal voltage of 100V to 260V, and one or more of the following characteristics: a lumen maintenance of >80%, a color temperature shift <200K from 100 to 10,000 hours, and lifetime of about 10,000 to about 25,000 hours.

17. (amended) A ~~design space of parameters for the design and construction of a~~ discharge lamp having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide mixture, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively, the said lamp exhibiting characteristics defined by a design space of parameters comprising ~~. Said design space including~~ at least one of the following parameters:

(i) the arc tube length, diameter and wall thickness limits of said discharge lamp correlated to and expressed as functions of lamp power, and/or color temperature, and/or lamp voltage; and

(ii) the electrode feedthrough structure limits used to conduct electrical currents with minimized thermal stress on the arc tube correlated to and expressed as a function of lamp current.

18. (amended) A lamp as claimed in Claim 17, wherein the design space ~~as claimed in Claim 17, wherein said~~ parameters also include:

(i) a general aspect ratio of the inner length (IL) to the inner diameter (ID) of the arc tube body that is higher than that of ceramic metal halide lamps having a power of less than about 150W;

(ii) the upper and lower limits of electrode rod diameter correlated to and expressed as a function of lamp current; and

(iii) a composition range of the salts correlated to color temperature and lamp voltage.

19. (amended) A Lamp as claimed in Claim 18 wherein the design space ~~as claimed in Claim 18, wherein said design~~ parameters include the following characteristics for the design of an arc tube and electrode feedthrough means for a given lamp power:

Power	IL	ID	IL/ID	Wall	Wall	Rod	Rod

W	mm	mm	Aspect Ratio, mm	Loading W/cm^2	Thickness mm	Diameter mm	Length mm
150	26-32	5-7	3.3-6.2	20-35	0.8-1.1	0.4-0.6	3-6
200	27-32	6.5-7.5	3.3-6.2	25-30	0.85-1.2	0.4-0.6	4-8
250	28-34	7.5-8.5	3.3-6.2	25-35	0.9-1.3	0.7-1.0	6-10
300	30-36	8-9	3.3-6.2	25-37	0.92-1.4	0.7-1.0	6-10
350	33-40	8.5-10	3.3-6.2	24-40	0.98-1.48	0.7-1.1	6-11
400	36-45	8.5-11	3.3-6.2	22-40	1.0-1.5	0.7-1.1	6-11

~~20.A method for the design and construction of a discharge lamp having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide mixture, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;~~

~~Which method comprises the steps of determining the dimensions of the arc tube of the discharge vessel and the electrode feedthrough means structure using a design space of Claim 17.~~

~~22. A method for the design and construction of a discharge lamp having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide mixture, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said~~

~~first and second discharge electrode feedthrough means, respectively;~~

~~Which method comprises the steps of determining the dimensions of the arc tube of the discharge vessel and the electrode feedthrough means structure using a design space of Claim 18.~~

~~23. A method for the design and construction of a discharge lamp having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide mixture, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;~~

~~Which method comprises the steps of determining the dimensions of the arc tube of the discharge vessel and the electrode feedthrough means structure using a design space of Claim 19.~~

~~24. A method as claimed in Claim 23, including the further design parameter that the metal halide comprises the~~

~~following salts of 6 25 wt% NaI, 5 6 wt% TlI, 34 37 wt%~~ ~~CaI_2, 11 18 wt% DyI_3, 11 18 wt% HoI_3, and 11 18 wt% TmI_3.~~

~~25. A method as claimed in Claim 24, including the further design parameter that the ionizable filling is a mixture of about 99.99% of Xenon and a trace amount of ^{85}Kr radioactive gas.~~

~~26. A method as claimed in Claim 25, including the further design parameter that the discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gas-tight manner by means of a sealing ceramic and has a part formed from aluminum oxide and molybdenum which forms a cermet at the area of the gas-tight connection.~~

~~27. A method as claimed in Claim 25, including the further design parameter that the discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode~~

~~which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gas-tight manner by means of a sealing ceramic and has a first part formed from aluminum oxide and molybdenum which forms a cermet at the area of the gas tight connection and a second part which is a metal part and extends from the cermet in the direction of the electrode.~~

~~28. A method as claimed in Claim 27, wherein the metal part is a molybdenum rod.~~

~~29. A method as claimed in Claims 26 and 27, wherein the electrode has a tip extension in the range of about 0.2 to about 1mm; the cermet contains at least about 35 wt.% Mo with the remainder being~~ $\cancel{Al_2O_3}$~~, and the as sealing ceramic flow completely covers the Nb connector.~~

~~30. A method as claimed in Claims 20 wherein the lamp produced has a power range of about 150W to about 1000W and nominal voltage of 100V to 260V, and one or more of the following characteristics: a lumen maintenance of >80%, a color~~

~~temperature shift <200K from 100 to 8,000 hours, and lifetime of about 10,000 to about 25,000 hours.~~

Add the following claims:

31. A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp having a power range of about 150W to about 1000W and exhibiting the characteristics of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about +10, and a luminous efficacy up to about 85-95 lumens/watt.

32. A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp having a power range of about 150W to about 1000W and exhibiting the characteristics of a lumen maintenance >80%, a color temperature shift <200K at 10,000 hours, a lifetime of about 20,000 hours, and a luminous efficacy >90 lumens/watt.

33. A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp exhibiting the characteristics of a lumen maintenance >80%, a color temperature shift <200K from 100 to 8000 hours, and a lifetime of about 10,000 to about 25,000 hours regardless of the rated power.

34. A discharge lamp having a power range of about 150W to about 1000W, exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean

perceptible color difference) of about +10, and (b) a luminous efficacy up to about 85-95 lumens/watt, and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively,

wherein the arc tube has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2.

35. A discharge lamp having a power range above 150W and exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about +10, and (b) a luminous efficacy up to about 85-95 lumens/watt, and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor

connected to said first and second discharge electrode feedthrough means, respectively,

wherein the aspect ratio (IL/ID) is in the range of about 3.3 to about 6.2mm.